

### **REMARKS**

This Response, submitted in response to the final Office Action dated December 22, 2006, is believed to be fully responsive to the points of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

Claims 1-21 are pending. Claims 1, 2, 8, 10-12, 15, 18 and 20 stand rejected under 35 USC 102(b) over U.S. Patent No. 6,355,156 (Li). Claims 3, 9, 19 and 21 have been rejected under 35 USC 103(a) over Li. Claims 3-7, 13, 14, 16, 17 and 19 stand rejected under 35 USC 103(a) over Li, in view of US 2003/0079989 (Klocke). Applicants respectfully submit the following comments in support of the patentability of the Claims. Reconsideration of the rejections in view of the following remarks is respectfully requested.

#### **1. Claims 1, 2, 8, 10-12, 15, 18 and 20:**

Claims 1, 2, 8, 10-12, 15, 18 and 20 stand rejected under 35 USC 102(b) over Li. Applicants appreciate the analysis presented by the Examiner but respectfully maintain their earlier position that none of the pending claims is anticipated by Li.

Claim 1 is directed to a method of monitoring machining in an electrochemical machining tool and includes, in part, synchronizing the excitation of the ultrasonic sensor to a machining cycle of the electrochemical machining tool. The synchronizing comprises delaying the excitation of the ultrasonic sensor a dwell time  $T_d$  after a reduction of the potential difference  $\Delta V$  across the electrode and the workpiece occurs, such that the exciting and receiving are performed during a number of machining off-times.

As noted on page 2 of the Office Action, "Li et al. does not specifically disclose an active step of synchronizing the sensor to a machining cycle of the ECM tool." Instead, the Examiner contends that "synchronizing is inherent in operation of the ultrasonic sensor with the ECM tool in that excitation of the ultrasonic tool is suggested during the off time interval of pulsed electrochemical machining (col. 5, lines 40-45)."

Applicants respectfully submit that synchronizing is not inherent to Li and that Li discloses another approach. Col. 5, lines 40-45 of Li teach that the DC power supply may

be turned off for a brief period of time, such as for the time interval used in pulsed electrochemical machining, so as to minimize the generation of gas bubbles for more accurate measurements. Thus, in contrast to the claimed step of *synchronizing the excitation of the sensor* to a machining cycle of the ECM tool, Li suggests *turning the DC power supply off* for a brief period of time. Not only is the synchronizing recitation of Claim 1 not inherent to Li, the portion of Li cited by the Examiner (col. 5, lines 40-45) teaches another approach, namely turning the DC power off for a brief period of time. The approach of Li is further clarified in Claims 7 and 8. As discussed in Applicants' previous amendment, adjusting the ECM voltage as suggested in the cited portion of Li could potentially compromise ECM machining quality. In contrast, by synchronizing the excitation of the ultrasonic sensor to the machining cycle of the electrochemical machining tool, improved ultrasonic monitoring is achieved without compromising electrochemical machining quality.

The Examiner further argues that “[m]ultiple measurements of the ultrasonic sensor would be inherently made in that the ultrasonic sensor is used in a method of ECM monitoring, and thus requiring multiple thickness measurements (claim 1, abstract).” Regardless, this does not teach or suggest the claimed recitation of *synchronizing the excitation of the sensor* to a machining cycle of the ECM tool. Rather, one skilled in the art would have turned the DC power supply off for a brief period of time, each time a measurement was to be made, as suggested in Col. 5, lines 40-45 and in Claims 7 (disconnecting the tool and the workpiece from the source of electrical power) and 8 (reducing the voltage).

On page 6 of the office action, the Examiner argues that a dwell time would be inherent to the method of Li. Regardless, Li does not teach or suggest synchronizing the excitation of the sensor, neither recognizing a need for synchronization nor disclosing means for accomplishing the synchronization. On the contrary in Col. 5, lines 45-50 and in Claims 7 and 8, Li teaches turning the DC power off (or reducing voltage, Claim 8) when calculating measurement. Applicants respectfully submit that the Examiner's inherency arguments ignore the approach disclosed in Li at Col. 5, lines 45-50 and in Claims 7 and 8. For at least these reasons, Applicants respectfully submit that claim 1 is

not anticipated by Li and respectfully request that the rejection of Claim 1 under 35 USC 102(b) over Li be withdrawn. Further, as Claims 2, 8, 10 and 11 depend from Claim 1, these claims are also not anticipated by the cited art for at least these reasons.

Applicants respectfully submit that Claims 12 and 15 are not anticipated by Li for reasons analogous to those presented above with reference to Claim 1. Further, as claims 18 and 20 depend from Claim 15, these claims are also not anticipated by the cited art for at least these reasons. In view of the above, Applicants respectfully request that the rejections of Claims 1, 2, 8, 10-12, 15, 18 and 20 under 35 USC 102(b) over Li be withdrawn.

**2. Claims 3-7, 13, 14, 16, 17 and 19:**

Claims 3-7, 13, 14, 16, 17 and 19 have been rejected under 35 USC 103(a) over Li, in view of Klocke.

Claim 3 depends from amended Claim 1. Accordingly, Applicants respectfully submit that Claim 3 is patentably distinguishable over Li for at least the reasons discussed above with reference to Claim 1.

Claim 4 depends from Claim 1 and further recites that the dwell time  $T_d$  is in a range of about seven milliseconds (7 ms) to about 15 milliseconds (15 ms). Klocke does not supply the deficiencies of Li discussed above with respect to Claim 1. Nor does Klocke supply the additional recitations of dependent Claim 4, as discussed in Applicants previous amendment. The Examiner contends that paragraphs 76-77 of Klocke teach that bubble minimization is a results effective variable and further that bubbles have an inherent time to leave the surface of a workpiece. In doing so, the Examiner appears to ignore the actual teachings of Klocke, which suggest *a list of variables* to produce relatively void-free photoresist films (for example agitation of the bath and vibration of the workpiece), none of which at all suggests a dwell time, let alone the recited dwell time. To the extent that the Examiner is arguing that it would have been obvious to try the claimed combination, Applicants respectfully submit that “obvious to try” is not the standard that needs to be met for a *prima facie* case of obviousness. Rather, there must be a reasonable

expectation of success by one of ordinary skill in the art. That has not been demonstrated here. Accordingly, Applicants respectfully submit that Klocke does not teach or suggest the additional recitation of Claim 4. Nor does Klocke supply the above-discussed deficiencies of Li. Accordingly, Applicants respectfully submit that Claim 4 is patentably distinguishable over Li and Klocke, either alone or in combination.

Claims 5-7 depend from Claim 1. As discussed above, Li does not teach or suggest synchronizing the excitation of the ultrasonic sensor to a machining cycle of the electrochemical machining tool, as recited by amended Claim 1. Klocke does not supply this recitation of Claim 1. For at least these reasons, Applicants respectfully submit that Claims 5-7 are patentably distinguishable over Li and Klocke, either alone or in combination.

Claims 13 and 14 depend from Claim 12. Klocke does not supply the above discussed deficiencies of Li with respect to Claim 12. Further, Applicants respectfully submit that Klocke fails to teach the additional recitation of Claim 14 for the reasons discussed above with reference to Claim 4. For at least these reasons, Applicants respectfully submit that Claims 13 and 14 are patentably distinguishable over Li and Klocke, either alone or in combination.

Claims 16, 17 and 19 depend from Claim 15. Klocke does not supply the above discussed deficiencies of Li with respect to Claim 15. Further, Applicants respectfully submit that Klocke fails to teach the additional recitation of Claim 17 for the reasons discussed above with reference to Claim 4. For at least these reasons, Applicants respectfully submit that Claims 16, 17 and 19 are patentably distinguishable over Li and Klocke, either alone or in combination. In view of the above, Applicants respectfully request that the rejections of Claims 3-7, 13, 14, 16, 17 and 19 under 35 USC 103(a) over Li, in view of Klocke, be withdrawn.

**3. Claims 3, 9, 19 and 21:**

Claims 3, 9, 19 and 21 have been rejected under 35 USC 103(a) over Li. Claim 3 depends from Claim 1 and is patentably distinguishable over Li, for at least the reasons

presented above with respect to Claim 1. Claim 19 depends from Claim 15 and is patentably distinguishable over Li for at least reasons analogous to those presented above with respect to Claim 1.

Claim 9 depends from Claim 8 and further recites that the exciting step includes exciting a first ultrasonic sensor to direct an ultrasonic wave toward a surface of one of the electrodes and exciting a second ultrasonic sensor to direct an ultrasonic wave toward a surface of another of the electrodes. Claim 9 further recites that the receiving step comprises receiving respective reflected ultrasonic waves from the surface of each of the respective electrodes using the respective ultrasonic sensors. Claim 9 also recites that the delaying step comprises delaying the excitation of a first one of the ultrasonic sensors the dwell time  $T_d$  after a reduction of the potential difference  $\Delta V$  across the electrodes and the workpiece occurs and delaying the excitation of the other of the ultrasonic sensors the dwell time  $T_d$  plus an offset  $\delta$  after a reduction of the potential difference  $\Delta V$  across the electrodes and the workpiece occurs, where the offset  $\delta$  is at least the time required to attenuate the ultrasonic wave from the first one of the ultrasonic sensors.

Applicants respectfully submit that Claim 9 is patentably distinguishable over Li for the reasons discussed above with respect to Claim 1. In addition, there is no indication, other than in Applicant's disclosure, of the combination recited in Claim 9. On page 4 of the office action, the Examiner agrees that Li does not disclose the additional recitations of Claim 9. Moreover, in the office action dated July 20, 2006, the Examiner states that Li does not teach the use of at least two ultrasonic sensors, the second ultrasonic [sensor] delaying the excitation by a dwell time plus an offset of at least the time required to attenuate the ultrasonic wave from the first ultrasonic sensor (page 6 of July 20, 2006 office action). However, the Examiner now argues that it would have been obvious to modify Li to practice the additional recitations of Claim 9. To the extent that the Examiner is arguing that it would have been obvious to try the claimed combination, Applicants respectfully submit that "obvious to try" is not the standard that needs to be met for a *prima facie* case of obviousness. Rather, there must be a reasonable expectation of success by one of ordinary skill in the art. That has not been demonstrated here.

Accordingly, Applicants respectfully submit that Claim 9 is patentably distinguishable over Li.

Claim 21 depends from Claim 15 and further recites controlling at least one of the energizing and the feeding in response to the monitoring data. Claim 21 is patentably distinguishable over Li for reasons analogous to those discussed above with respect to Claim 1. Further, there is no indication, other than in Applicant's disclosure, of the combination recited in Claim 21, and it appears that the Examiner has not addressed the additional recitations of Claim 21. Accordingly, Applicants respectfully submit that Claim 21 is patentably distinguishable over Li. In view of the above, Applicants respectfully request that the rejections of Claims 3, 9, 19 and 21 under 35 USC 103(a) over Li be withdrawn.

**CONCLUSION**

In view of the foregoing, Applicants respectfully submit that the application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are respectfully requested.

**Please charge all applicable fees associated with the submittal of this Amendment and any other fees applicable to this application to the Assignee's Deposit Account No. 07-0868.**

Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact Applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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